

REMARKS

Upon entry of this amendment, claim 1 will be amended and claim 19 will be added, whereby claims 1-19 will be pending (in contrast to the indication of claims 1-17 on the Cover Sheet (Form PTO-326) of the Official Action).

The amendment to claim 1 is in conformance with the disclosure in the originally filed application at page 13, lines 14-16, and does not include new matter. Moreover, claim 19 recites the invention in conformance with the originally filed disclosure, including the specification at page 5, beginning at line 17.

Reconsideration and allowance of the application are respectfully requested.

Response to Formal Matters

Applicants express appreciation for the return of the Form PTO-1449 with the Office Action. However, the form has not been completed with respect to the Examiner's name, the date of completion nor has the form been initialed. **Accordingly, the Examiner is requested to indicate consideration of the disclosure statement by initialing and returning to Applicants an initialed copy of the Form PTO-1449.**

Applicants express appreciation for the acknowledgment in the Office Action of the claim of priority under 35 U.S.C. 119, as well as receipt of the certified copy of the priority application.

Applicants note that the drawings submitted with the application have not been objected to, whereby it is assumed that all formal drawing requirements have been complied with in this application.

Response To Prior Art Rejections

The following rejections are set forth in the Official Action:

- (a) Claims 1, 4, 8 and 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Ferguson et al., U.S. Patent No. 4,767,479
- (b) Claims 1, 4-6, 8, 10-12, 14, 15, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2-225382.
- (c) Claims 7, 9, 10, 13, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2-225382.
- (d) Claims 1-15, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al., U.S. Patent No. 5,645,596, in view of JP 2-225382.

In response, Applicants note that claim 1 recites a method of manufacturing a ceramic composite, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, said slurry being synthesized by merely adding a phosphoric compound to a calcium compound slurry;

applying the slurry to the bonding surface of at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to bond them.

Applicants recited method includes, amongst other features, the use of a slurry that is obtained by adding a phosphoric compound, such as phosphoric acid, to a calcium compound slurry,

such as a calcium hydroxide slurry. In other words, Applicants' method includes a simple wet process wherein the synthesized slurry formed by adding a phosphoric compound to a calcium compound is used without adding other substances, whereby it is obtained by merely adding a phosphoric compound to a calcium compound slurry. Moreover, the slurry is in the form of primary particles of a bonding ceramic so that the particles can grow during the sintering process and then fuse. This enables the provision of enhanced bonding strength between the ceramic bodies.

In contrast, Ferguson discloses a method for bonding unsintered casting cores which respectively contain ceramic particles and a thermoplastic binder. The bonding of the casting cores is carried out in Ferguson by first softening a binder by using a softener or by heating, and then a ceramic particle layer is applied onto the surface of each casting core. The cores are then contacted with each other through their ceramic particle layers, and in this state they are heated for sintering the ceramic particles and volatilizing the binder.

In Ferguson, the particles of each ceramic particle layer contain various particles constituting the casting cores, whereby the particles comprise a mixture of various particles. This is different from a slurry in which primary particles of a bonding ceramic are dispersed, the slurry being synthesized by merely adding a phosphoric compound to a calcium compound slurry.

JP 2-225382 discloses a bonding material for ceramics. The bonding material is composed of an aqueous solution of a water-soluble polymer and a ceramic material contained therein as a filler. In JP 2-225382, the filler is obtained by forming the ceramic material powder into spherical secondary particles by granulating the ceramic material powder with spray drying, and then by milling or crushing the secondary particles. Alternately, JP 2-225382 discloses that the filler may

be used in the form of ceramic material powder whose average particle size is in the range of 0.1 to 15 μm .

Moreover, in JP 2-225382, the ceramic material is used once after it is formed into powder (secondary particles) while according to the presently claimed invention a bonding ceramic in the form of the slurry which is obtained just after synthesization is used. Further, the method according to JP 2-225382 essentially requires that the obtained powder is mixed into the aqueous solution of the water-soluble polymer. Although JP 2-225382 suggests that the filler can be used in the form of ceramic material powder, JP 2-225382 is silent as to whether or not the powder is primary particles like the particles in the instantly claimed invention.

Still further, Kim is directed to a method for manufacturing a ceramic vertebrae prosthesis, which also discloses that an apatite slurry is interposed between dense and porous bodies, and the bodies are then sintered to bond them together. Kim is silent as to whether the slurry is a slurry in which primary particles of a bonding ceramic are dispersed, and that the slurry is synthesized by merely adding a phosphoric compound to a calcium compound slurry.

Thus, Applicants respectfully submit that the only teaching or suggestion that would lead one having ordinary skill in the art to arrive at Applicants' invention is within Applicants' disclosure, and the use of such disclosure by the Examiner is improper. In order to support the conclusion that the claimed invention is either anticipated or rendered obvious over the prior art, the prior art must either expressly or inherently teach the claimed invention or the Examiner must present a convincing line of reasoning why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. Ex parte Clapp, 227 U.S.P.Q. 972 (B.O.A. 1985).

Additionally, each of the dependent claims is patentable over the prior art of record in view of the fact that each of these dependent claims includes the limitations of the independent claim. Moreover, each of the dependent claims is patentable over the prior art of record because it would not have been obvious to one having ordinary skill in the art to incorporate such dependent claim features into the invention as more broadly recited in the independent claim.

For example, dependent claim 16 recites that the slurry does not contain any resin components therein. As discussed in Applicants' specification, such as at page 5, beginning at line 17, this means that the slurry that is applied to the ceramic bodies to be bonded does not contain any water-soluble polymers such as binders, that is the ceramic composite does not contain any organic components. Accordingly, the ceramic composite of the present invention eliminates the danger that these organic components will elute into the living body when Applicants' ceramic composite is used as a biocompatible material. The prior art of record either discloses the inclusion of such materials, or is silent with respect thereto. Accordingly, claim 16 is patentable over the prior art for this additional reason.

Still further, the rejections of the dependent claims state the conclusion of obviousness of the features therein without providing reasoning for the statement of obviousness including any motivation to incorporate such dependent claim features in the prior art.

Regarding claims 17 and 18, Applicants respectfully submit that the ceramic composite and bone replacement material recited therein are patentable over the prior art, because the products recited therein are not taught or suggested in the prior art especially in view of the differences in the slurry as discussed above.

Accordingly, the rejections of record should be withdrawn as improper, and all of the claims should be indicated as allowable over the prior art.

Still further, newly-added independent claim 19 is directed to a method of manufacturing a ceramic composite, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface;

preparing a slurry in which primary particles of a bonding ceramic are dispersed in the absence of organic components;

applying the slurry to the bonding surface of at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to bond them.

Thus, amongst other features, claim 19 recites preparing a slurry in which primary particles of a bonding ceramic are dispersed in the absence of organic components. For the reasons set forth above, the method recited in this claim is not taught or suggested by the prior art, whereby this claim is also patentable over the prior art of record.

CONCLUSION

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims.

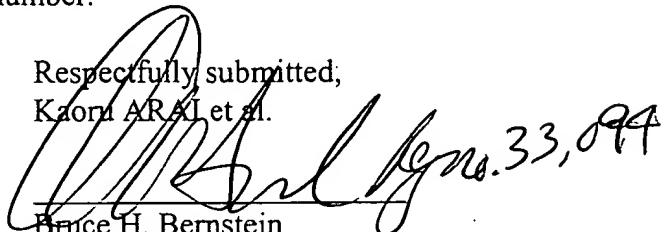
Applicants therefore respectfully request that an early indication of allowance of the application be indicated by the mailing of the Notices of Allowance and Allowability.

P18214.A04

Application No. 09/450,511

Should the Examiner have any questions regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
Kaori Arai et al.


Bruce H. Bernstein
Reg. No. 29,027

November 16, 2001
GREENBLUM & BERNSTEIN, P.L.C.
1941 Roland Clarke Place
Reston, Virginia 20191
(703) 716-1191

APPENDIX**Marked-Up Copy Of Amended Claim 1**

1. (Twice Amended) A method of manufacturing a ceramic composite, the method comprising [the steps of]:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, said slurry being synthesized by merely adding a phosphoric compound to a calcium compound slurry;

applying the slurry to the bonding surface of at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to bond them.